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Economic Climate, Infrastructure and FDI: Global Evidence with New Dimensions

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Abstract

This study revisits how infrastructure and economic environment affect FDI inflow. Using static and dynamic estimations on 81 countries from 1995 to 2013, the study finds electricity availability having the strongest positive impact alongside Economic Freedom and GDP. However, urban population and unemployment shows negative impact. This study suggests for urbanization with lower cost of living and developed infrastructure to attract more FDI.

Key words: FDI; infrastructure; investment climate; economic growth; electricity

JEL classification: F21; F23; F38; F43; P45

1. Introduction

Foreign Direct Investment (FDI) is a major contributor to economic growth especially in developing and under-developed economies. Many studies have tried to explore the possible determinants of FDI inflow, and the findings are overwhelmingly diverse and useful. In recent years, FDI worldwide has grown dramatically faster than trade and income. FDI inflows represent additional resources a country needs to improve its economic performance. It can also act as a catalyst for local investment by complementing local resources and providing a signal of confidence in investment opportunities.

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Why is FDI more attracted to certain countries? A large number of studies have tried to answer the question. Investment climate or economic climate significantly matters for the location decisions of foreign investors. Investment climate can affect the level of productivity, wages, return, employment, and capital reinvestment of foreign as well as local investors. The highest form of economic freedom provides the investors with an absolute right of property ownership, fully realized freedoms of movement for labor, capital, goods, and an absolute absence of coercion or constraint of economic liberty beyond the extent necessary for citizens to protect and maintain liberty itself. The other major role-playing factor in FDI decision is infrastructural development. Infrastructure refers to the physical facilities and installations that help a government or community run transportation, communication, sewage, water, electric systems, etc. that constitute the backbone of development in most economies.

Attracting FDI inflow into a country without proper investment climate and infrastructure is largely impractical. This paper re-examines the impact of economic climate and infrastructure on FDI inflow using a set of unique variables not available in existing literature. This study contributes to the existing literature in a number of ways: (i) in addition to urbanization, this study uses ‘electricity availability’ as a variable for infrastructure, which is a new dimension unavailable in existing literature; (ii) the use of electricity availability as a general determinant of FDI inflow (not as a variable for infrastructure) appears extremely rare and not found in the literature of last two decades; (iii) the set of variables used to define economic climate (Economic Freedom Index, GDP, and unemployment) has its uniqueness since it can comprehensively capture not only investment climate but also the overall state macroeconomic size and environment; (iv) the evidence presented in this study has strong appeal since it uses a large global level sample combined with a significantly long-term dataset; and (v) the findings generated by using this unique set of variables provides a completely new direction and inputs for FDI related policy formulations, especially in developing economies.

Following this introduction, section two contains the review of relevant literature. Section three and four analyze methodology and analysis of empirical results. Section five discusses the conclusion and policy implications.

2. Review of Literature

Though FDI is a much-discussed topic, it has yet to lose its appeal to researchers, academics, and policymakers. Past studies focus on the determinants of FDI flows with a significant diverse range of findings. Particularly in this article, we focus on the literature related to the impact of infrastructure and overall economic climate on FDI. In addition, we review literature on market size and urbanization. The former is related to economic environment, although it does not directly interfere with it, and the latter is closely interrelated with infrastructural development of an economy. Since literature findings are heavily diverse and inter-supportive, it is difficult to relay discussions on all factors.

Findings from different studies suggest that market size, infrastructural development, and investment climate highly influence the level of FDI and attract foreign investors. In a recent work, Akpan et al. (2014) find that market size, infrastructure availability, and trade openness play the most significant roles in attracting FDI to BRICS (Brazil, Russia, India, China, South Africa) and MINT (Mexico, Indonesia, Nigeria and Turkey) using data for 2001-2011. In a similar study, Vijayakumar et al. (2010) also find market size, labor cost, infrastructure, currency value and gross capital formation affecting FDI inflows of BRICS countries. The results are partly supported by Agrawal et al. (2013) adding that trade openness has a positive and "total available labor force" has a negative influence on FDI while ruling out the influence of gross capital formation. Besides, Blonigen and Piger (2011) find a widely different set of factors: cultural distance, parent-country per capita GDP, relative labor endowments, and regional trade agreements. Quazi (2007) suggests that increased familiarity with the host economy, better infrastructure, higher return on investment alongside greater trade openness, and economic freedom help attract more FDI. Among others, Chakrabarti (2001) and Janicki and Wunnava (2004) support these aforementioned results, adding few more new determinants such as stability of foreign exchange and host country risk. Of course, on many occasions, FDIs are more drawn by historical increasing pattern of FDI level (Noorbakhsh et al., 2001).

2.1 Economic/Investment Climate

Investment climate has become one of the common parameters used while analyzing FDI flows, although indicators to measure it may vary across studies. Stern (2003) defines investment climate as “the policy, institutional and behavioral environment, both present and expected, that influences how entrepreneurs perceive returns and risks associated with investment” (p.10). In other words, investment climate is about the environment in which firms and entrepreneurs of all types have opportunities and incentives to invest productively, create jobs and expand (The World Bank, 2005).

Cormican (2013) reports that low corporate tax rate helped the most in attracting more Japanese MNC investment in Ireland. Scholes and Wolfson (1990) and Desai et al. (2004) also support the significant role of tax, and the role of skilled labor is acknowledged by Noorbakhsh et al. (2001). However, there is research that suggests there being no relationship between institutional environment and FDI inflows (e.g., Stein and Daude, 2007; Walsh and Yu, 2010). Nevertheless, Nasir and Hassan (2011), also supported by Morris and Aziz (2011), suggest a more clear and strong positive relationship between economic freedom and FDI inflows in South Asian countries. Kinda (2010) shows that constraints related to investment climate, e.g. financing constraints, and institutional problems discourage FDI. In addition to finding economic freedom, Quazi and Mahmud (2006) and Masron and Abdullah (2010) also find trade openness, market size, human capital, incremental lagged changes in FDI, and political instability to be significant in five South Asian countries: Bangladesh, India, Nepal, Pakistan and Sri Lanka. However, Dollar et al.

(2006) find a different set of indicators such as low customs clearance times, reliable infrastructure, and good financial services for sound investment climates. Hallward-Driemeier et al. (2006) find that ownership and investment climate are relevant for investment, productivity, and growth. Dollar et al. (2002), based on a survey of over 1000 manufacturing establishments across 10 states in India, find a good investment climate to facilitate a higher volume of investment inflows, especially in the high productivity manufacturing and services sectors. They also suggest that controlling for firm size and industry type, value added per worker is about 44 percent lower in states where relatively poor investment climate prevails.

Political stability and corruption are also vital issues to ensure proper economic climate. Many studies have found that political instability seriously erodes foreign investors' confidence in the local investment climate (e.g., Barro, 1991; Corbo and Hebbel, 1991; and Lehmann, 1999). Higher degree of corruption in the economic system results in a poorer return on investment for the foreign investors and hence has a significantly negative impact on FDI as suggested by Hines (1995) and Henisz (2000). In Eastern Europe and the former Soviet Union in the 1990s, Javorcik and Wei (2009) studied 262 firms and found that an increase in corruption from the 'low' corrupt to 'high' corrupt country would reduce the probability of foreign investment by 15 percentage points. Cost of labor is also a vital factor of investment climate. Demirhan and Masca (2008) showed a positive relationship between labor costs and FDI inflow while Bevan and Estrin (2004) reported negative relationship. However, Loree and Guisinger (1995) found an insignificant relationship between the two.

2.2 Market Size

A variable (mostly GDP) representing the size of the host country market has appeared as an explanatory variable in many empirical studies on the determinants of FDI. In a seminal study, Culem (1988) found strong support for the market-size hypothesis affecting FDI inflow for six industrialized countries over the period 1969–1982. Examples of similar studies supporting the conclusion are Papanastassiou and Pearce (1990) for UK manufacturing FDI, Dunning (1980) for US FDI and Sader (1993) for developing countries. Market size is found to have a positive effect on FDI in several other studies such as Bandera and White (1968) and Lunn (1980). However, studies by Edwards (1990) and Asiedu (2002) show that there is no significant impact of growth or market size on FDI inflows though Loree and Guisinger (1995) and Wei (2000) suggest that market size and growth impact differ under different conditions.

2.3 Infrastructure

The urgency of high quality infrastructure for attracting greater FDI is evidenced by a number of studies on diverse and large geographical set of economies including (Ahmad et al., 2015; Mody et al., 1998; Wheeler and Mody, 1992; Cheng and Kwan, 2000; Richaud et al., 1999; Sahoo, 2006; Sahu, 2013; and Rehman et al., 2011) reveal a strong positive impact of infrastructure on attracting

FDI for Pakistan, suggesting that in the short-run, 1% increase in infrastructure results in improving FDI by 1.03% while in the long-run by 1.31%.Yol and Teng (2009) find that a 1% improvement in infrastructure would increase FDI flows by 2.6% annually. Wheeler and Mody (1992) suggest that for developing countries, infrastructure quality is an important variable for attracting FDI from the United States, but is less important for developed countries that already have high-quality infrastructures. Supporting this, Bae (2008) states that infrastructure in developed countries is not a motivator for large emerging economies. Electricity is one of the major determinants of infrastructure that affect decisions of foreign investors. Tang (2009) asserts that FDI and electricity consumption are cointegrated and positively correlated with the presence of bi-directional causality in Malaysia. In another study on Malaysia, Bekhet and Othman (2011) also evidence similar findings of the existence of cointegration and long run causality from electricity consumption to FDI. Using different dataset and techniques, Bekhet and Othman (2014) reinforce a significant long-run relationship between electricity consumption and FDI.

2.4 Urbanization

Studies by Kumar and Kober (2012), Can-ming and Jin-jun (2014), and Patra (2015) observe a significant positive correlation between urbanization and flow of FDI though Sit (2001) suggests no obvious relationship. Sahu (2013) found that cities in China with good infrastructure and established industrial base could attract more FDI signifying positive role of urbanization on FDI. However, there may also be a two-way relation, and many scholars also examined the influence of FDI on urbanization (for example, Abumere, 1982; Gwynne, 1982; Rogerson, 1982).

3. Methodology

3.1 Data and Variables

Data on 81 countries over the period from 1995 to 2013 have been used in this study. FDI inflow and GDP data were used from United Nations Council for Trade and Development (UNCTAD) statistics and data on unemployment, urbanization, and electricity consumption from World Development Indicators (WDI) while Economic Freedom Index (EFI) data was extracted from The Heritage Foundation. In the first stage, all countries of the world were taken into consideration; however, due to data unavailability and inconsistency, 81 countries were finally selected for this study.

3.2 Static Model Specification

To analyze the extent to which economic climate and infrastructural condition affect the inward flows of foreign direct investment on a global scale, we have designed the following functional form:

$$FDI_{it} = f(Ecoclimate, Infrastructure). \quad (1)$$

The model includes five independent variables: *(i) to capture Economic Climate* - GDP (Gross Domestic Product), EFI (Economic Freedom Index), Unemployment and (ii) *to capture the level of Infrastructure* – Urbanization and Electricity Availability.

To scale up data at a similar level, we have taken the natural log of all variables except three (EFI, Unemp, and U.Polpulation). Then, the model takes the form as follows:

$$lnFDI_{it} = \gamma + \beta_1 ln\, GDP_{it} + \beta_2 EFI_{it} + \beta_3 Unemp_{it} + \beta_4 U.Population_{it} + \beta_5 Aelectricity_{it} + \varepsilon_{it} \quad (2)$$

Here, i refers to the individual countries and t refers to the time period.

The dependent variable *FDI* stands for inward flows of Foreign Direct Investment measured in millions of US Dollars at current prices and current exchange rates. The following is the measurement of independent variables:

GDP denotes Gross Domestic Product measured in millions of US Dollars at current prices and current exchange rates. GDP captures both the size of the country and its economy.

Country size is an important factor for FDI attraction, and thus this variable has been included in the model to check its impact on FDI.

Economic Freedom Index *(EFI)* has been used to represent the investment climate of a country. The Heritage Foundation developed this index through analysis of 10 specific components of economic freedom including property rights, freedom from corruption, fiscal freedom, government spending, business freedom, labor freedom, monetary freedom, trade freedom, investment freedom, and financial freedom. This variable has been used in earlier literature as a proxy for investment and institutional climate. We have chosen to use this index as it encompasses a broad range of dimensions that are relevant for economic development. We expect a positive association between FDI inflow and this index.

Unemp refers to Unemployment rate, represented by the share of labor force that is without work but available for and seeking employment. We have used unemployment rate to represent the quality of macroeconomic environment of economies. As a higher unemployment rate leads to lower labor costs, a positive impact of unemployment rate on FDI inflow is expected.

Electricity availability *(Aelectricity)* is represented by Electric power consumption (kWh per capita). Electric power consumption measures the production of power plants and combined heat and power plants less transmission, distribution, and transformation losses and own use by heat and power plants. Electricity is a crucial infrastructural element for investment activities in an economy. The largest volume of FDI goes to industrial operations which require uninterrupted and high-quality electricity availability. Countries with poor electricity availability often miss out on FDI and investors move to other locations offering guaranteed and secured access to electricity. Besides increasing the cost of doing business, lack of consistent and adequate electricity supply may even cause production disruption leading to a loss. Thus, access to electricity is remarkably important to attract foreign investors who treat it as one of the major components of available infrastructure in an economy.

U.Population refers to Urban Population, which is measured as the percentage of population living in the urban area. This variable has been used as a proxy for urbanization. FDI flows more towards markets with greater urbanization rates since the market for products are wider there. This variable can also work as a proxy for infrastructural development in countries since greater urbanization results in greater level of infrastructure development.

3.3 Dynamic Panel Data (DPD) Model

Previous studies have found that current FDI flows also depend on previous FDI flows (e.g. Krifa-Shneider and Matei, 2010; Kinoshita and Campos, 2003; Quazi and Mahmud, 2006). Hence, without adding the lag value of the dependent variable as one additional independent variable, our analysis would suffer from the loss of dynamic information even in a panel data framework. Similar models have been used in earlier literature (e.g. Krifa-Shneider and Matei, 2010; Kinoshita and Campos, 2003; Khadaroo and Seetanah, 2009). To incorporate dynamic information, equation 2 is rewritten as follows:

$$lnFDI_{it} - lnFDI_{it-1} = \gamma_t + \delta lnFDI_{it-1} + \beta X_{it} + u_{it} \quad (3)$$

The above model is known as AR (1) model where the left side variable is the log difference in FDI over a period of time, X_{it} denotes the vector of explanatory variables $(GDP_{it}, EFI_{it}, Unemp_{it}, U.Population_{it}, Infrastructure_{it})$. $\gamma_t$stands for period specific intercept terms to capture common changes to all countries and u_{it} is the time variant idiosyncratic error term. Rearranging equation 3 and by taking first difference, we get equation 4 and 5 respectively as follows:

$$lnFDI_{it} = \gamma_t + (\delta + 1)lnFDI_{it-1} + \beta X_{it} + u_{it} \quad (4)$$
$$\Delta lnFDI_{it} = \gamma_t + (\delta + 1)\Delta lnFDI_{it-1} + \beta \Delta X_{it} + \Delta u_{it} \quad (5)$$

First, differencing helps us to remove unobserved heterogeneity in dynamic panel data (DPD) models. These models contain one or more lagged dependent variables, allowing for the modeling of a partial adjustment mechanism. In DPD, we can use two approaches to solve the problem of endogeneity. The first one is known as Instrumental Variable approach in which we may construct instruments for the lagged dependent variable from its second and third lags, either in the form of differences or lagged levels. However, this approach does not exploit all of the information available in the sample. The second approach is two Generalized Methods of Moments (GMM) estimators namely first and second step estimators (Arellano and Bond, 1991). GMM method is appropriate for small time periods and many individual units and a linear functional relationship of one left-hand dynamic variable that is depending on its past realizations (right-hand variables) that are not strictly exogenous. In this study, DPD model contains lagged value of FDI as one of the exogenous variables, which is not strictly exogenous. Hence, use of GMM methods is appropriate for the current study. In addition, a Hansen test for over-identifying restriction has been conducted. Another important diagnostic test is the autocorrelation of the residuals. It is natural to have a first order autocorrelation due to first differencing of the variables. However, the differenced residuals should not exhibit significant second order autocorrelation (AR-2). In addition, a Wald test for joint significance has also been run.

3.4 Diagnostic Tests

Among the various diagnostic tests, Lagrangian multiplier (LM) test results suggest that null hypothesis of no panel effect among entities is rejected and hence, Ordinary Least Squares (OLS) should not be used. On the other hand, the Hausman test result shows that the Chi^2 is less than 0.05 and therefore result is significant. It means the study should use fixed effect model. This result is also conceptually fit since we see that there are no time invariant variables in this model. The standard Hausman test leads to the conclusion that OLS estimation is likely to produce inconsistent coefficient estimates for the regression model. Therefore, the regression model should be estimated by fixed effects (within) regression. The estimated coefficients of regression equation 2 through OLS, fixed effect and random effect model estimation are shown in the column 2, 3 and 4 of table-1 respectively:

Various diagnostic tests in the above table demonstrate that modified Wald test for group-wise heteroscedasticity (Prob>chi2 = 0.0000) rejects the null hypothesis of homoscedasticity and found that heteroscedasticity is present in the model. Likewise, the Wooldridge test for autocorrelation also acknowledges the presence of first-order autocorrelation. In addition, the Pesaran cross-sectional dependence test result rejects the null hypothesis of cross-sectional independence and hence, evidence of cross sectional dependence is also found. Thus, fixed effect estimations need to be modified. If the residuals were only suffering from a heteroscedasticity problem, then the use of heteroscedastic robust estimations would give us consistent estimators. However, here standard errors should overcome both heteroscedasticity and autocorrelation problems. Hence, the use of fixed effects cluster analysis using country code would serve the purposes of the study (Hoechle, 2007).

Table 1. Result of OLS, Fixed Effect, and Random Effect Analysis

Explanatory Variables	OLS Estimates	Fixed Effect Estimates	Random Effect Estimates
lnGDP	.92**	1.26**	.99
	(.015)	(.092)	(.041)
	[0.000]	[0.000]	[0.000]
EFI	.22**	.24**	.23**
	(.062)	(.045)	(.045)
	[0.000]	[0.000]	[0.000]
Unemp	-.37**	-.31**	-.36**
	(.076)	(.057)	(.055)
	[0.000]	[0.000]	[0.000]
U.Population	-.38**	-.53**	-.41**
	(.108)	(.087)	(.080)
	[0.000]	[0.000]	[0.000]
lnAelectricity	6.57**	7.70**	6.79**
	(1.89)	(1.39)	(1.36)
	[0.001]	[0.000]	[0.000]
Constant	-43.21**	-49.12**	-44.37**
	(9.43)	(6.92)	(6.80)
	[0.000]	[0.000]	[0.000]
Number of observations	1539	1539	1539
Number of groups	-	81	81
R-squared	0.75	0.74	0.75
Adj R-squared	0.75	-	-
Root MSE	1.0797	-	-
F test (Prob> F)	0.000	0.000	0.000

Diagnostic Tests

Breusch and Pagan Lagrangian multiplier test Prob>$\bar{\chi}^2$=0.0000
Hausman test Prob>χ^2= 0.0433
Modified Wald test for group-wise heteroscedasticity Prob>χ^2= 0.000
Wooldridge test for autocorrelation in panel data Prob> F = 0.000
Pesaran's test of cross-sectional independence Prob = 0.0000

*** indicates coefficients are significant at 5% level of significance or at 95% Conf. Interval. Figures in parentheses and square brackets indicate the standard error and p value respectively.*

4. Estimation Results and Discussions

4.1 Static Panel Data Analysis Results

Since this model suffers from both heteroscedasticity and autocorrelation problems, we have used fixed effect cluster analysis using countries as cluster and the estimated results are shown in table-2.

Table 2. Results of Fixed-effects (within) Regression Clustering on Country

Explanatory Variables	Coefficients	Robust Std. Err.	T	P>|t|	[95% Conf. Interval]	
lnGDP	1.26 **	.190	6.63	0.000	.882845	1.640127
EFI	.24**	.050	4.76	0.000	.139766	.3404292
Unemp	-.31**	.069	-4.48	0.000	-.44334	-.170689
UPopulation	-.53**	.155	-3.40	0.001	-.834281	-.2176929
lnAelectricity	7.70**	2.23	3.46	0.001	3.26681	12.13892
constant	-49.12**	12.09	-4.06	0.000	-73.1793	-25.06132
F(5,80) = 85.17						
Prob> F = 0.0000						
Corr (u_i, Xb) = -0.6061						

*** indicates coefficients are significant at 5% level of significance or at 95% Confidence Interval.*

The results indicate that all variables have strong significant impact on FDI (at different levels e.g. 1% or 5%). However, the magnitude of impacts is mixed. With larger market size, better economic freedom and improved infrastructure have attracted significantly higher foreign direct investments although the extent of magnitude is different. Comparative analysis of the coefficients of these three factors revealed that electricity availability has significantly stronger and greater effect in attracting investments from foreign counterparts. As estimated, a 1% rise in electricity availability increases FDI by as high as 7.70%. This result contributes to the existing literature, as current studies mostly focus on causality and cointegration between electricity consumption and FDI. Lansbury et al. (1996) use electricity consumption per capita as a proxy variable for energy and suggested a very strong positive impact on FDI. The findings here also complement the findings of a positive relationship, cointegration, and causality from electricity consumption to FDI found by earlier studies (e.g. Tang, 2009; Bekhet and Othman, 2011: 2014). However, in another work, Bartekova and Ziesemer (2015) find electricity price negatively affecting the competitiveness of economies in attracting foreign investment. The significant positive coefficient of electricity consumption indicates that there is a high possibility of production outage, interruption, and technical failure due to disruption in electricity supply. A poor and disruptive electricity infrastructure would increase the cost of production and doing business and may even lead to business failure of the producers. In addition, once FDI is made in a country, it is usually extremely costly to leave withdrawing investment. Nevertheless, such decisions sometimes may be driven by the poor electricity availability. Therefore, foreign investors usually treat electricity availability as a major infrastructure component, and thus FDI flows to economies having higher electricity availability and improved infrastructural base.

The market size variable also has a significantly positive effect on the level of FDI flows (a 1% rise in GDP increases FDI by as much as 1.26%). In addition, as expected, better economic freedom (represented by greater values for EFI index) have a significantly positive influence on FDI inflows. Thus, improvement in each of these economic climate components by 1% induces a total of 1.50% increase in FDI inflow. The strong influence of economic freedom on FDI attraction is well established and strongly supported by numerous studies (Ajide and Eregha, 2014; Chaib and Siham, 2014; Bengoa and Sanchez-Robles, 2003; Caetano and Caleiro, 2009; Azman-Saini et al., 2010; Saadatmand and Choquette, 2012; Nasir and Hassan, 2011; and Pearson et al., 2012).

However, unemployment rate and urban population variables are found to have significant but negative impact on FDI inflow as opposed to the theoretical expectations of this study. Unemployment rate is negative, which might suggest that higher unemployment rate indicate lesser quality (in terms of skills, training, education, etc.) of human resources in the countries and hence, investors are reluctant to invest in those countries since global FDI is increasingly becoming reliant on advanced technology and know-how. This argument makes sense if the least developed nations or developing nations are taken into consideration where investment is limited only to labor-intensive industries, and technology-intensive investments are fast flowing into the economies having more expert and skilled human resources. Thus, highly technology-intensive FDIs require lesser labor involvement, which validates the other side of the findings why FDI may flow more to those countries where unemployment rate is low. Low unemployment has an indication that people are skilled and hence, everyone finds a job based on that at home or abroad. This finding is also consistent with earlier literature (e.g. Cieslik, 2005; and Hisarciklilar et al., 2014). Pearson et al. (2012) suggested that higher unemployment might cause more crime discouraging risk-averse investors.

Another interesting result is that urbanization, as represented by urban population, is found to have a negative impact on the FDI inflows. As urbanization is a good indicator of infrastructure development and living quality, higher FDI is generally expected to flow to the economies having better urbanization. However, this finding is really interesting and shoots another line of thought to us that although urbanization (regarding infrastructure) is important for FDI, a greater number of people living in urban area may not always be positively contributing. Having more people living in urban areas may indicate employment opportunities or better living standard resulting in higher living costs and labor cost in the urban areas. Hence, foreign investors may not find such increase in labor cost favorable to invest in those cities or countries. Moreover, foreign investors more often invest in heavy infrastructure, factories, and development activities, which more urbanized areas may no longer require. Empirical evidence supporting similar outcomes can be found in the study of Poelhekke and van der Ploeg (2008). They concluded that medium-sized cities stimulate growth but congestion, pollution, and overcrowding associated with mega-cities seem to depress economic performance. However, other authors found that urbanization had a positive impact on FDI attraction (Patra, 2015; Sit, 2001; Behname, 2013; Yavan, 2010; and Hsiao and Shen, 2003).

4.2 Dynamic Panel Data Analysis Results

In order to avoid the loss of dynamic information, this study conducts the DPD analysis by extending the static model (equation 2) incorporating the lagged value of FDI as additional independent variables (equation5). The detail results of estimated equation 5 using first-step GMM estimators are given in Table3. The Arellano-Bond test result (Prob> z = 0.190), as shown in table 3, ensures that there is no second order autocorrelation. The result of Hansen test (Prob>χ^2 = 1.000) rules out the existence of over-identifying restrictions. In addition, the model also passes the test of joint significance as shown by F statistics.

Table3. Dynamic Panel Data Estimation (First Step GMM Estimation)

ExplanatoryVariable	Coefficients	t	p>t	[95% Conf. Interval]
lnFDI(Lagged)	0.40**	6.53	0.00	0.2786858
	(0.061)			0.5228298
lnGDP	0.86**	4.51	0.00	0.4819337
	(0.192)			1.244002
EFI	0.09***	1.69	0.095	-0.0164298
	(0.055)			0.2017918
Unemp	-0.28**	-5.09	0.00	-0.3833551
	(0.054)			-0.1678682
U.Population	-0.38**	-3.79	0.00	-0.5818424
	(0.100)			-0.1812471
lnAelectricity	4.74**	3.74	0.00	2.220452
	(1.267)			7.262183

Diagnostic Tests

F Test Prob> F = 0.000

Arellano-Bond test for first order autocorrelation AR(1) Prob> z = 0.000

Arellano-Bond test for second order autocorrelation AR(2) Prob> z = 0.190

Hansen test of over identifying restrictions Prob>χ^2 = 1.000

** *indicates coefficients are significant at 5% level of significance or at 95% Confidence Interval.*

**** Significant at 10% level or 90% confidence interval. Figures in the parentheses indicate the standard error.*

The results for all independent variables obtained in DPD analysis are consistent with those obtained in static panel analysis. However, since we are now dealing with the difference variables, the magnitude of each coefficient has become smaller. However, confirming our previous result, electricity availability has the strongest positive influence on FDI compared to market size and Economic Freedom Index (though, EFI loses some significance). The robust coefficient of lagged FDI is 0.40 unveiling the self-reinforcing effect of FDI, specifically, the level of lagged

FDI significantly contributed towards the foreign investment for the current year. As we found in static analysis, unemployment rate and urban population negatively influence the FDI in this dynamic model. However, here, the magnitudes are more stable and small.

5. Conclusion

The findings clearly suggest that countries having poorer infrastructure in terms of electricity and other utility facilities can attract less FDI and vice versa. We find that poor or shortage of electricity has reduction effect on FDI. Poor electricity availability will make economies unattractive as it increases the cost of doing business significantly. A larger urban population may not be much help as it might significantly raise the cost of resources including labor and other utilities. Therefore, countries should try to achieve larger urbanizations by keeping living cost and cost of labor and resources as low as possible. A higher urbanization level would ensure better infrastructure, including greater electricity availability. The finding that unemployment has a negative effect on FDI is interesting as more unemployment is supposed to attract more FDI through the availability of cheap labor. However, unemployment, due to lack of required skill, may act reverse as FDIs are becoming highly reliant on advanced technology. In addition, unemployment leading to more crime in the society may drive away foreign investors. On this basis, countries should make a larger effort in educating and training its population, which would attract sophisticated and large-scale FDI. Finally, in the economic environment (measured by EFI) would essentially help countries attract more foreign investors. The overall findings of this paper remain consistent with earlier studies. However, this paper clearly draws a distinctive interlink among electricity availability, urbanization, and unemployment that might be helpful for policy-makers in designing a favorable strategy for attracting higher FDI.

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